Public Health Assessment for

PAGEL'S PIT
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS
CERCLIS NO. ILD980606685
AUGUST 10, 1995

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

PAGEL'S PIT

ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

CERCLIS NO. ILD980606685

Prepared By:

Illinois Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperataive agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports

identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When infomed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

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SUMMARY

The Pagel's Pit Landfill site (Winnebago Reclamation Landfill or WRL) is a former limestone quarry that was converted into a solid waste disposal landfill. The site occupies about 100 acres (the landfill occupies approximately 47 acres) and is 5 miles south of Rockford in New Milford, a rural, unincorporated area of south Winnebago County. The landfill has been in operation since 1972 and, according to the landfill operator, still has approximately 3 to 5 years before reaching capacity. The discovery of area private well contamination resulted in the placement of the nearby Acme Solvents site on the United States Environmental Protection Agency's (USEPA) National Priority List (NPL or Superfund) in 1985. The WRL was also a suspected contributor to area groundwater contamination and was placed on the NPL in June of 1986.

An investigation of Acme Solvents during 1984-1985 resulted in the provision of home groundwater treatment systems for several area residents with affected wells. Since Acme Solvents and the affected private wells are upgradient of the landfill, the WRL is not considered a contributor to this contamination.

A Remedial Investigation (RI) was conducted for the WRL between 1988 and 1990 and determined the groundwater contamination as the main public health concern associated with this site. Area groundwater west of the landfill and on the southwest border of the landfill has been impacted by contaminants. While several contaminants were found above levels of health concern in area groundwater, there is no exposure to these compounds.

The Illinois Department of Public Health (IDPH), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR) has determined that the site currently poses no apparent public health hazard since there is presently no indication of exposure to contaminants at levels of health concern. The site could pose a health threat due to the potential for future exposure to groundwater, however, the locations of the private wells and the direction of groundwater flow make this exposure unlikely. The installation of the gas extraction system and the existence of the leachate collection system also reduces the potential for contaminant transport off-site. Furthermore, remedial actions planned for the site should eliminate the potential for future exposure to groundwater. Past exposures to contaminants in air and surface soils may have occurred at this site, however, it is impossible to characterize these potential exposures because of limited data.

The community surrounding the site is concerned with potential health effects from drinking and using contaminated groundwater in the area. As previously stated, however, affected area wells have been provided water treatment systems and future residential well contamination is unlikely since the nearest residence is 1/2 mile from the site. IDPH has recommended that private wells located in the path of the contaminants plume be monitored regularly in order to determine if contaminants have affected previously uncontaminated wells.

BACKGROUND

A. Site Description and History

The Pagel's Pit Landfill site (also known as the Winnebago Reclamation Landfill or WRL) is a former limestone quarry that has been converted into a solid waste disposal landfill. The site occupies about 100 acres (the landfill occupies approximately 47 acres) and is approximately 5 miles south of Rockford in New Milford, a rural, unincorporated area of south Winnebago County (Figures 1 and 2) (12). In 1972, Rockford Blacktop Construction Company, owner of the site, converted the limestone quarry into a landfill. The sides and bottom of the 35 foot deep pit were graded and lined with 2 inches of asphalt. The asphalt was then sealed with a coal tar sealer (8). A leachate collection system covering the base of the landfill was also installed. Leachate was collected through perforated pipes which drained into a series of manholes. The leachate was then pumped from the manholes into a lined leachate pond on top of the landfill where it was aerated and periodically trucked to the wastewater treatment plant in Rockford (8 pg 2). In 1992, a sanitary sewer line was installed which connects the WRL site to the Rock River Water Reclamation District, a local publicly owned treatment works (POTW). Since then, leachate has been piped to the District by sewer line. A landfill gas collection system is also in operation at the WRL.

The original operational permit for the WRL was issued for the disposal of municipal wastes, and sewage sludge from the Rockford Sanitary District. In 1984, a sludge drying system was installed to reduce the volume of the sewage sludge prior to its disposal in the WRL. The landfill gas, primarily methane and carbon dioxide, is collected from the WRL and is used to fuel the on-site sewage sludge drying system. In addition to municipal solid wastes, special wastes, including plating and painting sludges, and industrial wastes were accepted at the WRL (12). The quantity of industrial wastes disposed of at the WRL is not known.

On numerous occasions, nearby residents have complained of odors in the area and blowing litter from the WRL. In addition to the landfill, the sludge drying facility has most likely contributed to some odor problems in the area. Other potential sources of odor in the area include the alcohol manufacturing plant which operated from 1985 through 1986 on property adjoining the WRL, the hog feedlot located to the west of the WRL site, and the septic tank pumping and cleaning business west of the WRL site.

In 1980, the Winnebago County Health Department (WCHD) responded to complaints by a neighboring homeowner of gas seeping into the basement of his home. Subsequent investigations by the WCHD and representatives of the WRL found that methane and carbon dioxide gases, generated during the anaerobic decomposition of landfill materials, were migrating away from the landfill through the subsoils. Results of an investigation conducted by Warzyn Engineering Inc. showed that methane gas was migrating in several directions from the refuse area. Based on this finding the WRL owner installed a methane gas venting system of wells to control the migration of gases from the site. Subsequent monitoring

performed after the installation of the gas venting system indicated that the system was controlling the lateral migration of gases from the landfill.

In 1981, the WCHD discovered organic chemical contamination in five nearby private wells (Figure 3). These wells (E through H and P) were contaminated with varying levels (in excess of 400 parts per billion total) of several chlorinated ethanes and ethenes. The source(s) of the contamination was unknown.

Located directly east of the WRL is Acme Solvents, a former industrial waste disposal site. In 1982 this site was placed on the NPL because of identified soil and groundwater contamination. A Remedial Investigation/Feasibility Study (RI/FS) conducted by the E.C. Jordan Company in 1984 detected numerous organic and inorganic compounds including volatile and semi-volatile compounds, and polychlorinated biphenyls (PCBs) in the soils on-site. In addition, a volatile organic contaminant plume was identified in the groundwater beneath and around the Acme Solvents site. The contaminant plume was found to be migrating to the west-southwest from the Acme site.

The WRL was placed on the National Priority Listing (NPL) in June of 1986 due to the discovery of arsenic, cadmium and bis(2-ethylhexyl)phthalate in groundwater at the site (5,12). In 1986 the WRL's potentially responsible parties (PRPs) entered into a consent order with the USEPA to perform a RI/FS at the site. The RI/FS was conducted to determine the role the WRL may have played in the volatile organic contamination of groundwater in the area, better characterize area groundwater flow and determine the source(s) of the contaminants, perform a risk assessment to evaluate potential health effects associated with the groundwater contamination, and to develop data for remedial alternatives for the site. Results confirmed the findings of earlier studies conducted in the area. Volatile organic compounds (VOCs), including aromatic hydrocarbons and chlorinated ethenes and ethanes, were detected in leachate and groundwater samples. Groundwater flow in the area was determined as generally from east to west.

A Record of Decision (ROD) presenting the selected remedial action for the WRL was signed on June 28, 1991 by USEPA with Illinois Environmental Protection Agency (IEPA) concurrence (5,9). This ROD applies only to the first operable unit which includes all of the site with the exception of the contaminated groundwater in the southeast corner. This contamination will be addressed in the future under a separate ROD. The selected remedy should not interfere with the operation of the landfill and includes:

- a sanitary landfill cover for the waste disposal area;
- groundwater extraction along the west side of the site;
- on-site groundwater treatment by carbon adsorption or air stripping following pretreatment with a solids filter, with the treated water being discharged to surface water;
- removal of inorganics by treatment, if necessary, prior to carbon adsorption or air stripping;

- leachate extraction and transfer to the local publicly owned treatment works for treatment;
- gas extraction and the use of the gas for fuel or the flaring of the gas; deed restrictions for land surrounding the site; and
- site monitoring and maintenance of all remedial action components (9).

A Consent Decree was signed by USEPA and the responsible parties in February of 1993. The decree provides money for remedial activities and recovery of some of USEPA's costs.

B. Site Visit

Staff from IDPH have conducted several site visits, the most recent of which was October 1994. WRL is an active municipal waste landfill with heavy traffic in and out of the facility daily. The majority of the site is fenced and access to the landfill is gained through the main entrance on Lindenwood Road. An attendant is present at this gate during all operational hours. Access to areas of the site that are not fenced is restricted by heavy woods and steep slopes. The closed portion of the site is vegetated and well kept. No debris or dust was noticed migrating from the site during the October 1994 visit.

C. Demographics, Land Use, and Natural Resources Use

Demographics

The WRL is located in a very sparsely populated, rural section of southern Winnebago County and is situated on the west side of Lindenwood Road, south of Baxter Road. Approximately 430 homes exist within a 3-mile radius around WRL (5). Of these, approximately 24 homes with an estimated population between 60 to 70 people are located within a 1/2-mile radius (4). Middle class, Caucasian families make up the majority of this population. The distance from the site boundary to the nearest residence is approximately 500 feet (east of the site).

Land Use

Land use in the area is residential, recreational, and mostly agricultural. In addition to the active landfill operation, site activities consist of an active sewage sludge drying plant and an inactive alcohol production plant. Both of these facilities are located to the north of the landfill. These two facilities are bordered to the north by farmland. The primary crops grown in this area are corn and soybeans. The Meridian Forest Preserve is 1 mile northwest of the landfill. Killbuck Creek, which runs north and south along the western edge of the WRL property, flows within 250 feet of the landfill border. The creek is shallow and impassible to boating in the vicinity of the site. Killbuck Creek is, however, used for sport fishing further downstream. The creek is not used as a source of water for human consumption, livestock consumption, or irrigation of farm crops. It merges with the Kishwaukee River about 2 miles north of the WRL. Two intermittent streams flow north and

south of the landfill and merge with Killbuck Creek at points 1,000 feet northwest and 1,200 feet south of the site.

West of the WRL is a heavily wooded area. Directly south is an open field. East across Lindenwood Road is Acme Solvents, a former industrial waste disposal site. This site was placed on the NPL in 1985. Remedial action is currently being conducted at this site by representatives of the Acme PRPs with USEPA oversight.

Natural Resource Use

The WRL is situated in the Rock River Hill Country of the Till Plains section of the Central Lowland Physiographic Province. This area is characterized by broad, rolling uplands rising above alluvial valleys. Soils in the area are part of the Hononegah series. These soils are the result of glacial deposition and are described as dark brown, loamy, course sands with a characteristically high permeability. These soils have a pH that is neutral to acidic and have a relatively low organic matter content.

The geology of the WRL site consists of unconsolidated materials overlying bedrock. The unconsolidated materials range in thickness from 8 to 100 feet (12). The unconsolidated materials near the WRL are predominantly sands and gravels in the lower portions of the unit with silts or clays near the ground's surface. The bedrock near the WRL is composed of highly fractured dolomite.

Warzyn reports that the fractures are dominantly horizontal bedding planes frequently cross-cut by vertical fractures. Groundwater near the WRL is contained in both the unconsolidated materials and the underlying bedrock. The water table is situated in the fractured bedrock east of and below the eastern quarter of the WRL. The water table occurs in the unconsolidated formations in the remaining three-quarters of the WRL. Groundwater flow in the area is multidirectional (12). In the upper aquifer, flow is generally from east to west. Groundwater flow in the northern portion of the site is toward the west, while in the southern portion flow is toward the south-west. Near Killbuck Creek, north of the landfill, the groundwater flows west to southwest toward the creek. South of the WRL, the groundwater appears to flow from the east to the southwest toward the creek. The average annual precipitation in the area is 38 inches, with two-thirds occurring during the spring and summer months. The prevailing winds in the area are from the west-northwest (12).

The homes in the area rely on private wells for their water supply. In February of 1987, the Acme Solvents PRPs installed whole-house carbon filters in five homes with wells contaminated with VOCs. The locations of these wells (G through L) are shown in Figure 3. Two filter systems have been taken out of service because the homes are unoccupied, and the PRPs continue to maintain the filter systems in the other three homes.

D. Health Outcome Data

The community in the area of the WRL site and Acme Solvents site have concerns related to each site. In response to the contamination and concerns, members of the Acme Solvents area community are participating in ATSDR's Trichloroethene (TCE) Exposure Registry and are being contacted at yearly intervals concerning their health status. Since the WRL site and the Acme Solvents site may be affecting the same communities, IDPH will consider each site in the Community Health Concerns Evaluation subsection of the Public Health Implications Section.

COMMUNITY HEALTH CONCERNS

Residents in the area of the WRL and the Acme Solvents sites have expressed concern over contaminated groundwater. Complaints were filed with the Winnebago County Health Department (WCHD), IEPA, and IDPH in 1981 concerning groundwater quality. USEPA and IEPA have conducted public meetings to discuss the RI/FS remedial activities. These meetings provided opportunities for public comment. During these meetings and conversations with IEPA, WCHD, IDPH, and local government officials, the following community health concerns were raised:

1. What are the potential long-term health effects associated with exposure to site-related contaminants?

2. What are the impacts expected from contamination to Killbuck Creek?

3. Is there a health hazard from exposure to landfill gas to local residents?

4. Is leachate escaping from the site? Is it flowing into Killbuck Creek?

Community health concerns were updated December of 1994 through contact with IEPA and USEPA representatives, and local county health officials. No new concerns were expressed.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The tables in this section list the contaminants of concern that are associated with the WRL site. These contaminants will be further evaluated in the remaining sections of this health assessment to determine if they pose a threat to public health. **The listing of a contaminant in the following tables does not necessarily mean that the contaminant poses a threat to public health.** The selection of these contaminants is based on the following factors:

1. Concentrations of contaminants on and off the site.

2. Data quality, both in the field and in the laboratory, and the sampling plan design.

3. Comparison of contaminant concentrations and background concentrations with health assessment comparison values for both carcinogenic and noncarcinogenic endpoints (discussed further below).

4. Community health concerns

Comparison values for health assessment are media-specific chemical concentrations that are used to select contaminants for further evaluation. These values, prioritized below, include Environmental Media Evaluation Guides (EMEGs), Cancer Risk Evaluation Guides (CREGs), Reference Dose Media Evaluation Guides (RMEGs), Lifetime Health Advisories (LTHAs), and Maximum Contaminant Levels (MCLs). If a site-related contaminant is discovered at levels above any of these comparison values it will be investigated further in the remaining sections of the health assessment to determine if it poses a significant threat to public health.

EMEGs are comparison values developed for chemicals that are potentially hazardous, frequently encountered at NPL sites, and present a potential for human exposure. They are derived to protect the most sensitive members of the population (e.g., children) and are not cut-off levels, but rather comparison values. They do not consider carcinogenic effects, chemical interactions, multiple routes of exposure, or other media-specific routes of exposure, and are very conservative concentration values.

CREGs are estimated contaminant concentrations based on one excess cancer in a million persons exposed to a chemical over a lifetime. These are also very conservative values designed to protect sensitive members of the population.

RMEGs are comparison values based on USEPA reference values which are estimates of a daily oral exposure to a certain chemical that is not likely to produce any noncarcinogenic adverse health effects over a lifetime. These values have been adjusted to protect sensitive members of the population.

LTHAs are concentrations an individual can be exposed to through drinking contaminated water for 70 years without experiencing any noncarcinogenic health effects. These numbers contain a margin of safety to protect sensitive members of the population. These values are only considered if no EMEG, CREG, or RMEG is available for the chemical.

MCLs have been established by USEPA for public water supplies to reduce the chances of adverse health effects from contaminated drinking water. These standards reflect the best achievable levels considering the occurrence, relative source contribution factors, monitoring capabilities, cost of treatment, available technology, and health effects. These are enforceable limits that public water supplies must meet. These values are only considered if no EMEG, CREG, RMEG, or LTHA is available for the chemical. Proposed Maximum

Contaminant Levels (PMCL) are also sometimes used in the absence of MCLs. These are proposed standards under consideration by the USEPA.

Compounds for which none of the above health comparison values exist will be considered as contaminants of concern and will be assessed in the remainder of the health assessment. Known or suspected human carcinogens will also be included if no cancer comparison value exists.

During the RI for this site, areas on and around both Acme and WRL were studied. Sampling was conducted in two phases and consisted of the installation and subsequent sampling of several new monitoring wells, groundwater sampling of the shallow aquifer, leachate sampling from the landfill, sampling of surface water and sediments from nearby Killbuck Creek, and air samples from the landfill. The purpose of Phase I activities was to define the nature and extent of potential releases of leachate to the groundwater around the site (12). Phase I activities included collection of four rounds of leachate samples from various areas of the facility, installation of 15 new groundwater monitoring wells adjacent to and downgradient form the site, collection of two rounds of groundwater samples from various wells around the site, collection of one round of surface water and sediment samples, and collection of ambient air samples. At the completion of Phase I activities, the Interim Groundwater Quality Evaluation (IGQE) was prepared and submitted to USEPA. Phase II sampling was based on recommendations in the IGQE and included collection of two more rounds of groundwater samples from some existing wells, another round of surface water samples, and another round of leachate samples. The boundaries of this site have not been well defined and on- and off-site groundwater samples were not delineated in the RI. Groundwater evaluation in this health assessment, therefore, has been presented in the On-Site Contamination section and includes both on- and off-site groundwater analysis.

A. On-Site Contamination

Groundwater

The first two rounds of groundwater samples were taken during Phase I operations in April and June of 1988. Rounds 3 and 4 were taken during Phase II operations in February and April 1990. Round 1 and 2 samples were collected from wells on or around the Acme Solvents site (Figure 5). Round 3 and 4 samples focused on wells that were around the perimeter of the landfill or downgradient (west) of the site. Results were generally consistent between all four rounds indicating the greatest contamination in monitoring wells near the Acme Solvents site and just west of Lindenwood Road. Both of these areas are upgradient of the WRL and the source of this contamination is unknown. The Acme Solvents site is a potential source of this contamination. Samples taken from wells downgradient of the landfill also indicate some migration of contaminants northwest of the landfill. It has been suggested that the plume from WRL has overlapped a pre-existing plume from Acme Solvents based on specific indicator contaminants (12). It is difficult, therefore, to definitively distinguish which contaminants have migrated from the WRL site and which have come from the Acme Solvent site or other area sources.

Chlorinated hydrocarbons are the main contaminants of concern in groundwater around this site (Tables 2 and 3). The greatest concentrations were detected upgradient of the landfill; however, several of these compounds were detected above levels of health concern in downgradient wells. Several other organic compounds were also detected in area groundwater. Only one, benzene, was detected above levels of health concern.

Several metals were detected in wells throughout the area, particularly around the perimeter of the landfill. Five metals were detected above levels of public health concern in area groundwater (Table 2). One private well downgradient of the site was also sampled during rounds 1 and 2. This well displayed no site-related contamination.

An attempt to determine the origin of contamination was made through the use of inorganic compounds associated with the landfilling operations; however, this information is conjectural and does not definitively identify the origin of the contamination. In particular, the chloride ion (Cl^-) was chosen as an indicator of contamination from the WRL since this compound was detected in WRL leachate and was not detected in significant quantities upgradient of the site. Several upgradient wells were chosen to provide background chloride concentrations with values ranging from 3 milligrams per liter (mg/l) to 30 mg/l. Wells that displayed contamination above these background levels of chloride were assumed to have been contaminated with compounds from the WRL facility. If chloride was not detected in the wells above background levels, the contamination was assumed to be from a different source. Other potential sources of chloride contamination in groundwater include the use of residential water softeners, road salts, and dust suppressants.

Two general areas of elevated chloride contamination were discovered (Figures 6 to 9). These areas, the northwest quadrant of the WRL and well G110 (south-east border of the landfill) displayed elevated levels of chloride well above background levels in round 1 sampling. Round 2 sampling indicated a similar pattern with the addition of elevated concentrations in the deep well G116. This indicates that the plume from WRL has migrated west below Killbuck Creek. Well G116A, the shallow well west of Killbuck Creek, did not display elevated chloride levels indicating that the WRL plume has not affected the shallow aquifer in this area. Rounds 3 and 4 chloride sampling were consistent with rounds 1 and 2 indicating contamination in the northwest quadrant of the site and near the southeast border of the landfill. Recent information has indicated that leachate-hauling trucks were loaded near the contamination discovered at the southeast border and may be a possible contributing source of the contamination. Chloride concentrations also appeared to be elevated in well G115 at the southwest border of the landfill.

Leachate

Four rounds of leachate samples were collected during Phase I of the RI from August 1988, to June 1989 and a fifth round was collected during Phase II in the spring of 1990. In each of the five rounds of sampling, two samples were collected from leachate extraction manholes which are connected to the base leachate collection piping system. The remaining four samples in each round were collected from various gas extraction wells located in the

eastern portion of the WRL (12). Figure 4 shows the leachate sampling locations. The leachate composition characterizes the waste materials and the type of contaminants that could potentially reach the underlying soils and groundwater through faults in the asphalt liner of the WRL. Table 1 indicates the results of the leachate sampling from 1981 to 1984 and during 1988 to 1989. Round 5 sample results indicated contamination consistent with rounds 1 through 4.

The leachate samples taken during the RI generally contained higher concentrations of aromatic VOCs such as benzene, toluene, and xylenes than the chlorinated VOCs vinyl chloride and dichloroethene. Tetrachloroethene was detected only once and trichloroethene was not detected at all. Previous leachate sample results (1981 to 1984) generally follow these same concentration trends, indicating that the leachate composition has not changed significantly over this time span (1981 to 1990). The WRL leachate has a high inorganic component consistent with typical sanitary component leachates, except it has higher than typical chloride and sodium content.

Air

Ambient air monitoring was conducted October 24 and 25, 1988 at the WRL site (12). The samples consisted of one upwind location northwest of the landfill and three downwind locations on the east half of the landfill on the south side. The meteorological station was located close to the center of the landfill. Winds during the sample collection were generally from the northwest at speeds varying from 0 to 10 miles per hour. The results of the air sampling indicated the presence of 15 VOCs at levels below the National Ambient Air Quality Standard for hydrocarbons (non-methane) which is 0.16 milligrams per cubic meter (12). However, the data was of limited value because sample holding times were exceeded.

B. Off-Site Contamination

Surface Water

Surface water samples were collected at five locations along Killbuck Creek. Four sample locations were downstream of the site and one upstream to serve as a background sample. Several inorganic compounds were chosen to serve as indicator chemicals to determine if leachate from the WRL has impacted the creek. Concentrations of the indicator compounds upstream of the site were compared to concentrations downstream to make this determination. The was no difference between upstream and downstream concentrations of indicator compounds in surface water indicating that the leachate from the landfill has not impacted the creek (12). Surface water samples were also analyzed for organic compounds. One low level concentration of chloroform (0.29 ug/l) was detected in a sample from the creek, but no other organic compounds were detected above laboratory detection limits.

Sediments

Sediment samples were collected at five locations along Killbuck Creek. Four sample locations were located downstream of the site and one upstream to serve as a background sample. Several inorganic compounds were chosen to serve as indicator chemicals to determine if leachate from the WRL has impacted the creek. Concentrations of the indicator compounds upstream of the site were compared to concentrations downstream to make this determination. There was no difference between upstream and downstream concentrations of indicator compounds in sediments, indicating that the leachate from the landfill has not impacted the creek (12). Sediment samples were also analyzed for organic compounds. Chloroform and two phthalates (di(2-ethylhexyl) phthalate and di-n-butylphthalate) were detected in low concentrations below levels of health concern in sediment samples. No other organic compounds were detected in downstream sediment samples.

C. Quality Assurance and Quality Control

All samples were collected and analyzed in accordance with IEPA and USEPA protocol as agreed upon in the Quality Assurance Project Plan (QAPP). Several round 1 and 2 leachate samples were discarded due to difficulties in laboratory analyses, however, subsequent modification of analytical procedures corrected the difficulty and rounds 4 and 5 leachate data were considered useable. Holding times were exceeded for round one groundwater samples resulting in several estimated values. The data was, however, determined to be useable. Air sampling data for the WRL site were not adequate, since holding times for the samples were exceeded.

D. Physical and Other Hazards

The WRL is an active, licensed landfill presenting physical hazards typical of such operations. Daily operation of heavy equipment, traffic in and out of the site, and dumping of debris all present hazards to both employees and individuals dumping at the WRL. The collection, distribution, and use of methane gas from the landfill to fuel the sludge drying facility at the site may also pose a potential explosive hazard to employees and nearby residents. An explosion did occur at the collection and storage facility in 1991 highlighting this potential concern. The cause of the explosion is suspected to have been associated with a leak and subsequent accumulation of methane gas inside of the gas storage building. No injuries were reported and damage was limited to the gas storage building on-site.

E. Toxic Release Inventory Data

Since the reporting of toxic releases began in 1987, the USEPA has collected information on estimated annual releases of toxic chemicals by industry to the environment (air, water, land, or underground injection). This data is compiled and retrievable through the on-line database, Toxic Chemical Release Inventory (TRI). The reporting years 1987 to 1992 are currently available for review.

The TRI records were reviewed for reporting industries in the vicinity of the WRL site. No industries within a 3-mile radius reported releases of chemicals to the environment. This was anticipated since land use around the site is primarily agricultural or residential.

PATHWAYS ANALYSES

To determine whether nearby residents are exposed to contaminants migrating from the WRL, IDPH evaluates the environmental and human components that lead to human exposure. This pathways analysis consists of five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and an exposed population.

IDPH categorizes an exposure pathway as a completed or potential pathway if the exposure pathway cannot be eliminated. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present. Table 4 identifies the completed exposure pathways and Table 5 identifies the potential exposure pathways. The discussion that follows these two tables incorporates only those pathways that are important and relevant to the site. IDPH will also discuss some of those exposure pathways that have been eliminated.

A. Completed Exposure Pathways

Air

Past and future exposure pathways are possible from contamination of ambient air on-site. Potentially exposed populations include on-site workers, local residents, and trespassers. The possible route of exposure is inhalation. During air monitoring 15 VOCs were detected but the data were of limited value since sample holding times were exceeded. No VOCs detected at any sample location exceeded National Ambient Air Quality Standards. Since sampling data is unreliable, IDPH cannot evaluate past exposures.

Future exposures to VOCs from the WRL are not likely due to the gas extraction system currently in operation. Landfill gas is collected by a network of 91 extraction wells and is used as a fuel source in a sludge drying operation. During combustion of the gas, VOCs are also burned. This system is currently in operation at the site reducing the potential for present exposures.

Fugitive dust generation is not expected to be a substantial transport mechanism that may lead to exposures. Dust control measures are utilized at the site during landfilling operations. Water is sprayed on the surface of the work area, when necessary, and a clean soil cover is placed over landfilled waste to reduce the release of fugitive dusts. After closure of the landfill, it is anticipated that IEPA and USEPA will require a cap and vegetative cover as part of the final closure plan. This will reduce the potential for future

exposures to fugitive dusts. The gas extraction system will also remain in place, reducing the potential for future exposures.

B. Potential Exposure Pathways

Private Wells

Residents utilizing groundwater downgradient of the WRL may be exposed to contaminants in the future. Ingestion, inhalation, and skin contact are routes of exposure that may occur during groundwater use. Residential wells located upgradient of the WRL have also been contaminated by VOCs. Groundwater flow in the area of the two sites is generally from east to west, making the Acme Solvents site upgradient from the WRL. The source of these contaminants has not yet been verified. The contaminant plume extends at least 900 feet downgradient from the western edge of the landfill. The closest private well downgradient of the WRL is located approximately 1/2 mile from the boundary. Future contamination is possible to wells located downgradient of the WRL. The rate of groundwater movement in the area has not been estimated due to the complex sub-surface .

The potential routes of exposure associated with the private wells pathway include ingestion, inhalation, and dermal contact. As stated earlier in the assessment, these exposures are not expected to occur, since the contaminated groundwater plume from the WRL site is moving to the west of the site. The nearest residence west of the site is located approximately 1/2 mile from the site boundary. As stated in the ROD, a groundwater extraction system will be installed by the owner/operator of the WRL to deter the migration of the contaminant plume and to reduce the contaminant concentrations in the groundwater. The installation of this system would eliminate private wells as a potential pathway, thus eliminating the future routes of exposure.

The private wells upgradient (east) of the site are not discussed in this assessment since the groundwater plume is moving in the opposite direction. These wells and the potential health effects associated with domestic water use are discussed in the Acme Solvents Health Assessment.

Sediment

Future exposure pathways are possible from sediments in Killbuck Creek. Dermal contact is the route of exposure that would be most significant if the sediments become contaminated. Incidental ingestion is not a likely route of exposure due to the dimensions of the creek. Killbuck Creek is shallow (1 to 3 feet deep) and swimming is not a current activity in this body of water. Dermal contact with sediments during wading or fishing is the likely exposure route.

Past sampling of creek sediments has not revealed contamination above levels of health concern. Metal concentrations detected in sediments are within background concentrations or expected normal ranges based on the geologic conditions (12). Sediments may become a

significant exposure pathway in the future if contamination migrates into the creek from the WRL. Since contaminants have not been detected in sediments at levels above health concern, this pathway and related exposures will not be addressed further.

Surface Water

Future exposure pathways are possible from surface water if Killbuck Creek becomes contaminated from the WRL. One compound, chloroform, was detected in surface water samples, however, levels were far below those of public health concern.

Residents utilizing the creek for wading or fishing may become exposed to site related contaminants by inhalation or direct skin contact in the future. Incidental ingestion is not considered a plausible exposure route since swimming is not a recreational activity in the creek. Significant exposures may occur if contaminants migrate from the WRL and contaminate the creek. Migration of contaminants may occur via groundwater discharge due to the high water table in the area.

Surface Soils

Past, present, and future exposure pathways are possible from on-site surface soils. Trespassers and site workers may have been exposed in the past and may be exposed in the future by ingestion, inhalation, or dermal contact from contaminated soils.

No surface soil samples have been collected on-site to determine past or present contamination. Since this is an operating landfill, direct exposure to surface soils is likely, due to the landfilling activities, but exposures would be expected to be transient and difficult to evaluate. Surface soil is continually turned over as areas are covered daily with top soil. IDPH is unable to assess these exposures since no data are available.

Fish

Future exposure pathways are possible from contamination of fish in the Killbuck Creek. Killbuck Creek is reportedly used for sport fishing. Local residents may become exposed in the future by ingesting contaminated fish from this creek. No fish sampling has been performed, due to the low levels of contaminants detected in the sediments and surface water. If contaminants migrate to the creek from the WRL in the future, fish may become contaminated representing a potential pathway.

PUBLIC HEALTH IMPLICATIONS

A. Toxicological Evaluation

IDPH will not discuss health effects associated with specific contaminants detected at this site due to the lack of data for past exposures and the lack of present exposure to site-related contaminants. Future exposures to site-related contaminants is also unlikely due to scheduled remedial activities. Workers, and possibly trespassers, have probably been exposed to contaminants in on-site surface soils and ambient air, but the lack of data prevents IDPH from estimating exposures and discussing health effects from specific contaminants. Contaminants have been detected in groundwater monitoring wells around the perimeter of the site above ATSDR comparison values, but the distance of the contaminant plume is reportedly about 1/2 mile from the nearest residential well and is not expected to reach the well if remedial activities proceed as planned. The list below identifies contaminants detected above ATSDR comparison values in monitoring wells located on and downgradient of the site.

- Arsenic
- Benzene
- Carbon Tetrachloride
- Chloroethane
- Cobalt
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- Methylene Chloride
- Nickel
- Thallium
- 1,1,2,2-Tetrachloroethane
- Trichloroethene
- Vinyl Chloride
- Zinc

At this time, it is not necessary to discuss potential health effects associated with these contaminants since future exposures are unlikely. Remedial activities at this site should ensure that the contaminant plume does not reach private wells downgradient of the WRL. If the contaminant plume does migrate near these wells (i.e., absence of remediation), IDPH will address potential health effects associated with the contaminants detected in the plume. IDPH will also address health effects from exposures to sediments, surface water, fish, and surface soils if these media become contaminated in the future.

B. Health Outcome Data Evaluation

No state or local health outcome data have been reviewed for this health assessment. The populations involved living near the WRL and the Acme Solvents sites are too small for evaluation through state cancer, mortality, and adverse pregnancy outcome registries.

At the present time, known exposures are only identified with the Acme Solvents site. Members of the community around Acme Solvents are participating in ATSDR's TCE Exposure Registry and are being contacted at yearly intervals concerning their health status.

Since no known exposures have been identified at the WRL, review of databases is not necessary at this time.

C. Community Health Concerns Evaluation

IDPH has addressed the community health concerns associated with this site as follows:

1. What are the potential long-term health effects associated with exposure to site-related contaminants?

IDPH has identified two possible past exposure pathways: air and surface soils. Trespassers and on-site workers may have been exposed to contaminants via inhalation or dermal contact. The installation of the gas extraction system on-site should eliminate most exposure to contaminants in the air. Subsequent exposures to contaminants not captured by the system or at times the system may shut-down due to mechanical complications are considered to be minimal. Exposures may be occurring from on-site surface soils. The lack of data for air and soils prevents IDPH from estimating exposures and discussing potential health effects for these media.

No exposures have been identified off-site. Concentrations detected in off-site surface water and sediments in Killbuck Creek indicate past and present exposures have been minimal and no adverse health effects would be expected. Killbuck Creek should not be impacted in the future by the WRL, based on past sampling data and the absence of transport mechanisms, thus future exposures are not expected. Groundwater in the area has been impacted by both the WRL site and the Acme Solvents site. Private wells located upgradient of the WRL have been addressed in the Acme Solvents Health Assessment. Private well users utilizing groundwater downgradient (west) of the WRL are at a great distance (greater than 3,000 feet) from the identified plume. Remediation activities should ensure these wells are not contaminated in the future, eliminating concern for long-term health effects.

2. What are the impacts from contamination to Killbuck Creek?

No impacts are expected from contamination associated with the WRL. Past sampling of the creek has verified the landfill has not contaminated surface waters or sediments to an extent to cause adverse health effects. Possible contamination from the Acme Solvents site is addressed in the Acme Solvents Health Assessment.

3. Is there a health hazard from exposure to landfill gas to local residents?

As stated in previous sections of the health assessment, a gas extraction system utilizing 91 gas extraction wells has been installed at the site. The gas is used as a

fuel source in a sludge drying operation. During combustion of the gas, contaminants are also burned. The gas extraction system has minimized present and future exposures to local residents.

4. Is leachate escaping from the site? Is it flowing into Killbuck Creek?

During construction of the landfill, a leachate collection system was installed. The floor of the landfill was graded to drain to various manholes placed throughout the landfill. Leachate is removed by a series of eight submersible pumps that are moved to service the manholes existing in the landfill. Leachate is also periodically pumped out of the gas extraction wells. In 1992, a sanitary sewer line was installed which connects the WRL site to the Rock River Water Reclamation District, a local publicly owned treatment works (POTW). Since then, leachate has been piped to the District by sewer line. Even though the leachate system is in operation, contaminants have migrated outside the landfill boundaries through groundwater. The contaminated groundwater plume is estimated to be at least 900 feet from the western boundary. It does not appear that leachate has impacted the Killbuck Creek, based on previous surface water and sediment sampling.

CONCLUSIONS

The Pagel's Pit Landfill currently poses no apparent public health hazard since there is presently no indication of exposure to contaminants at levels of health concern. The site could pose a health threat due to the potential for future exposure to groundwater, however, the locations of the private wells and the direction of groundwater flow make this exposure unlikely. The installation of the gas extraction system and the existence of the leachate collection system also reduces the potential for contaminant transport off-site. Furthermore, remedial actions planned for the site should eliminate the potential for future exposure to groundwater. Past exposures to contaminants in air and surface soils may have occurred at this site, however, it is impossible to characterize these potential exposures because of limited data.

Residents living upgradient from the site have concerns about groundwater contamination from the Acme Solvents site. These concerns are addressed in the Acme Solvents Health Assessment. IDPH will continue monitoring data from the WRL and assess future exposures if contaminants migrate to off-site media that may result in exposure.

RECOMMENDATIONS

IDPH recommends the following actions at the WRL to monitor contaminants and to assess future exposures:

1. Annual sampling of surface water and sediments in Killbuck Creek.

2. Annual sampling of appropriate monitoring wells in the area of the site to determine the extent of migration o the contaminant plume. IDPH also recommends installing more monitoring wells west of the landfill to accurately define the groundwater plume and to monitor its migration off-site. Private wells in the area of the plume migration should also be sampled for possible site-related contamination.

3. Sampling of on-site surface soils to better characterize potential past and present exposures to contaminated soil.

4. Continued operation of the gas extraction system and the leachate collection system as long as necessary to deter migration of contaminants.

Health Activities Recommendation Panel (HARP) Recommendations

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended, the Pagel's Pit site has been evaluated for appropriate follow-up with respect to health activities. Area residents with known exposure to chlorinated solvents are participating in ATSDR's TCE Exposure Registry. As part of the ATSDR Physician Education Cooperative Agreement, IDPH has developed and given a seminar for health professionals and area residents regarding the potential health effects associated with exposure to contaminants found at this site and others in the area. Additional educational and informational offerings are being developed. No other follow-up health activities are being planned at this time. If additional information suggests that exposure to significant levels of site-related hazardous substances is occurring or has occurred in the past, ATSDR and the IDPH will re-evaluate this site for any indicated follow-up.

Public Health Actions

Based on the recommendations made in this health assessment, the following public health actions have been or will be undertaken.

Actions Undertaken

1. Residents around the WRL site have been included on ATSDR's TCE Registry. Educational workshops for area health professionals and area residents have also been conducted in the area of this site by IDPH in conjunction with ATSDR. Workshops have focused on groundwater contamination with chlorinated solvents.

Actions Planned

1. No further actions are being planned at this time. When more data becomes available, IDPH, in conjunction with ATSDR, will re-evaluate the site.

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Office of the Assistant Administrator

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CERTIFICATION

The Pagel's Pit Landfill Public Health Assessment was prepared by the Illinois Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

William Greim, M.S., M.P.H
Technical Project Officer
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ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment, and concurs with its findings.

for RCW

Robert C. Williams, P.E., DEE
Director, DHAC, ATSDR

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2) Agency for Toxic Substances and Disease Registry. Public Health Assessment Guidance Manual. Atlanta, GA. March, 1992.

3) Ecology and Environment, Inc. Acme Solvents Superfund Site, Winnebago County, Illinois, Remedial Investigation. July, 1985.

4) Illinois Department of Public Health. Draft Public Health Assessment for Acme Solvents, Inc., Winnebago county, Rockford, Illinois, CERCLIS NO. ILD053219259. Springfield, IL. July, 1992.

5) Illinois Environmental Protection Agency. Division of Land Pollution Files. Springfield, IL. 1992.

6) United States Department of Agriculture, Soil Conservation Service. Soil Survey of Winnebago and Boone Counties, Illinois. March, 1980.

7) United States Environmental Protection Agency. Toxic Chemical Release Inventory. National Library of Medicine, National Toxicology Information Program, Bethesda, MD. August, 1992.

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10) Warzyn Inc., Feasibility Study Report, Winnebago Reclamation Landfill, Rockford, Illinois. March, 1991.

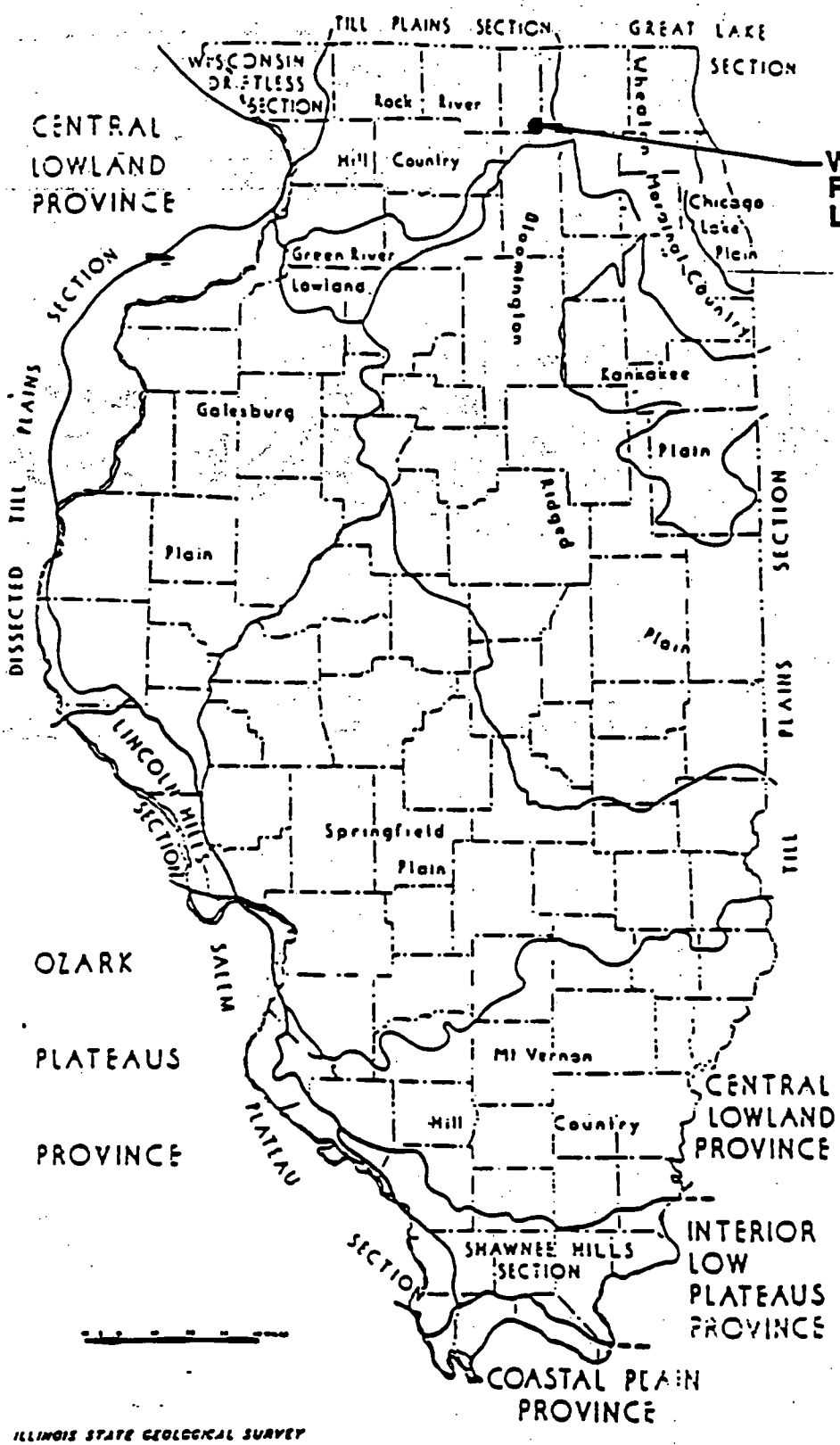
11) Warzyn Inc., Interim Groundwater Quality Evaluation, Winnebago Reclamation Landfill, Rockford, Illinois. March, 1990.

12) Warzyn Inc., Remedial Investigation Report, Winnebago Reclamation Landfill, Rockford, Illinois, Vol. 1-2. March, 1991.

13) Winnebago County Health Department. Private Well Water Analyses, Acme Solvents. Rockford, IL. 1981.

APPENDICES

APPENDIX A - FIGURES



MAP FROM LEIGHTON, et.al.,1948

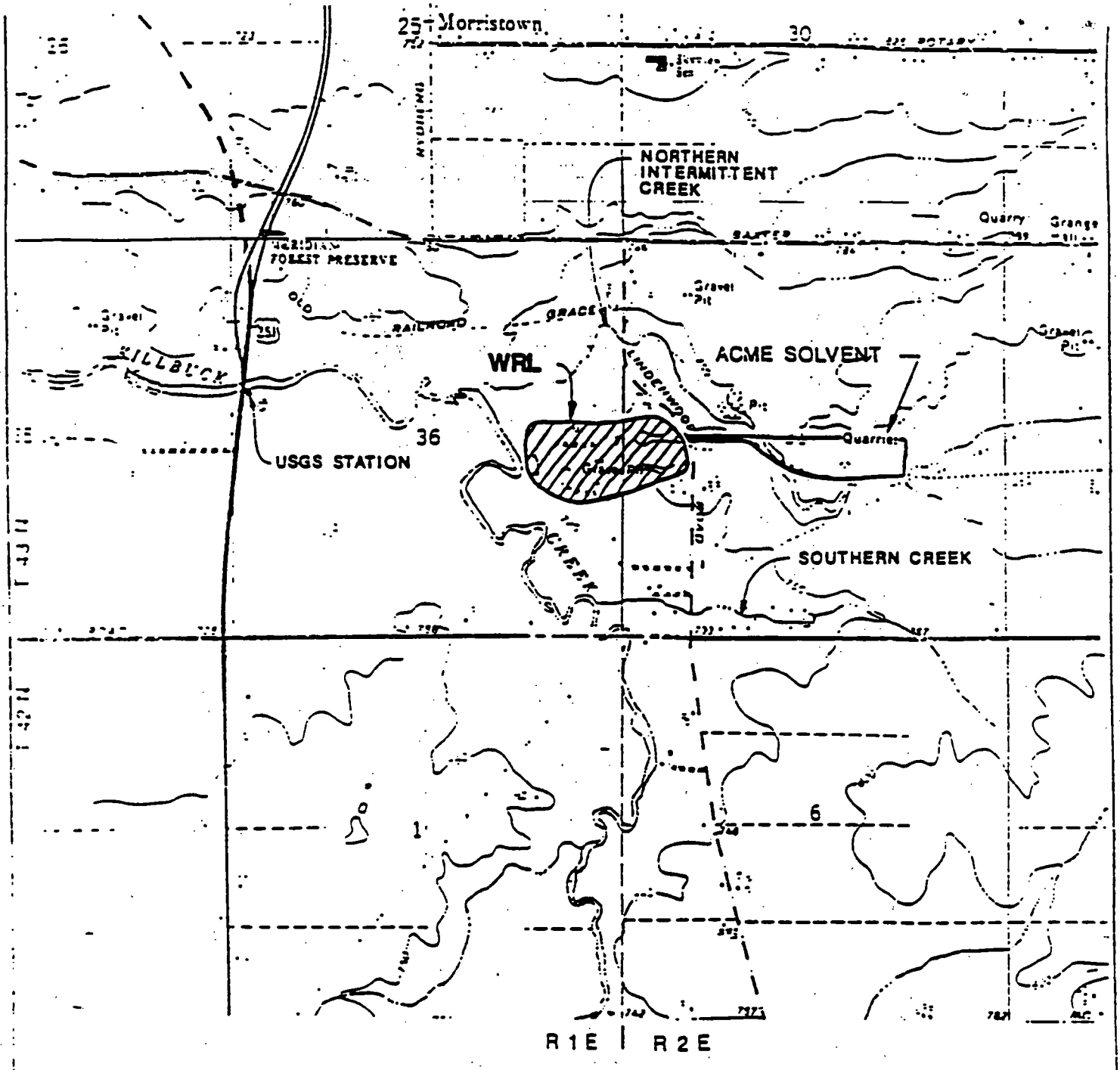
Figure 1

north

WARZYN

PHYSIOGRAPHIC DIVISIONS OF ILLINOIS
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

Source: Remedial Investigation 1991



BASE MAP DEVELOPED FROM ROCKFORD SOUTH, ILLINOIS
7.5 MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP
DATED 1971; PHOTOREVISED 1976

Figure 2

north

SCALE: 1"=2000'

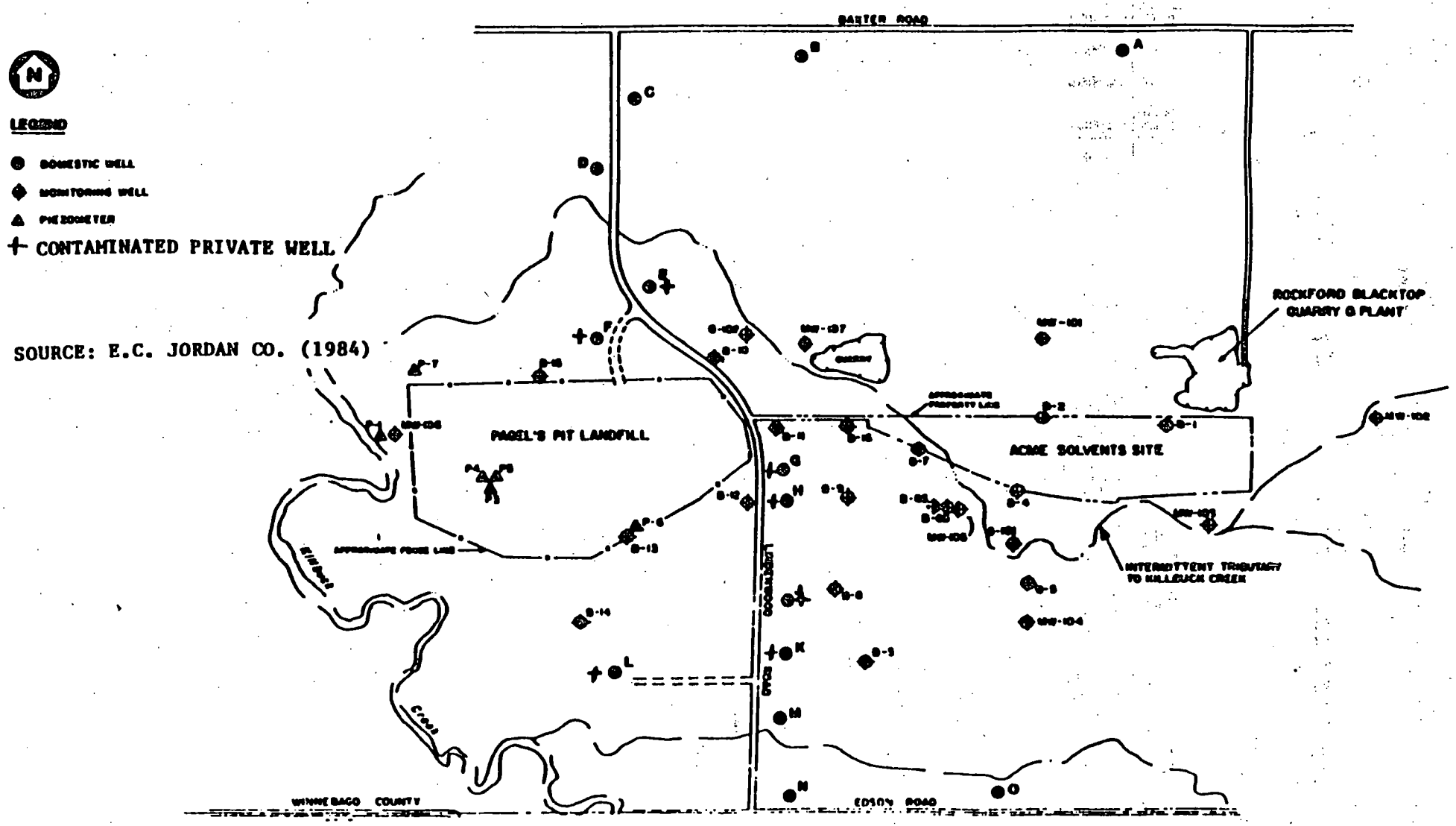
WARZYN

SITE LOCATION MAP

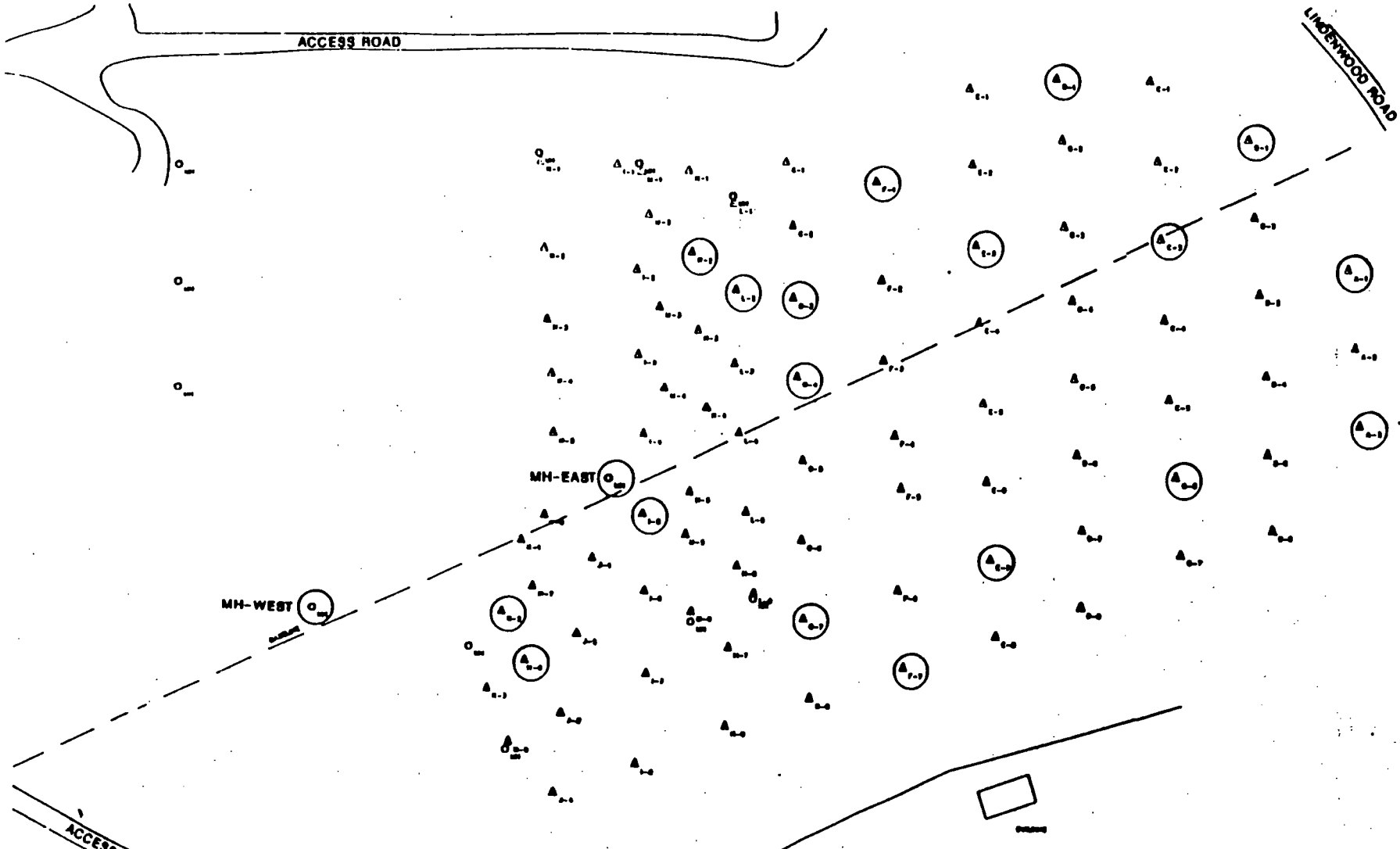
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

Source: Remedial Investigation 1991

FIGURE 3 - GROUNDWATER SAMPLE LOCATIONS ON AND AROUND THE ACME SOLVENTS SITE.



SOURCE: E.C. JORDAN CO. (1984)



LEGEND

- GAS WELL/LEACHATE EXTRACTION POINT
- LEACHATE COLLECTION SYSTEM MANHOLE
- EXTRACTION WELLS SAMPLED

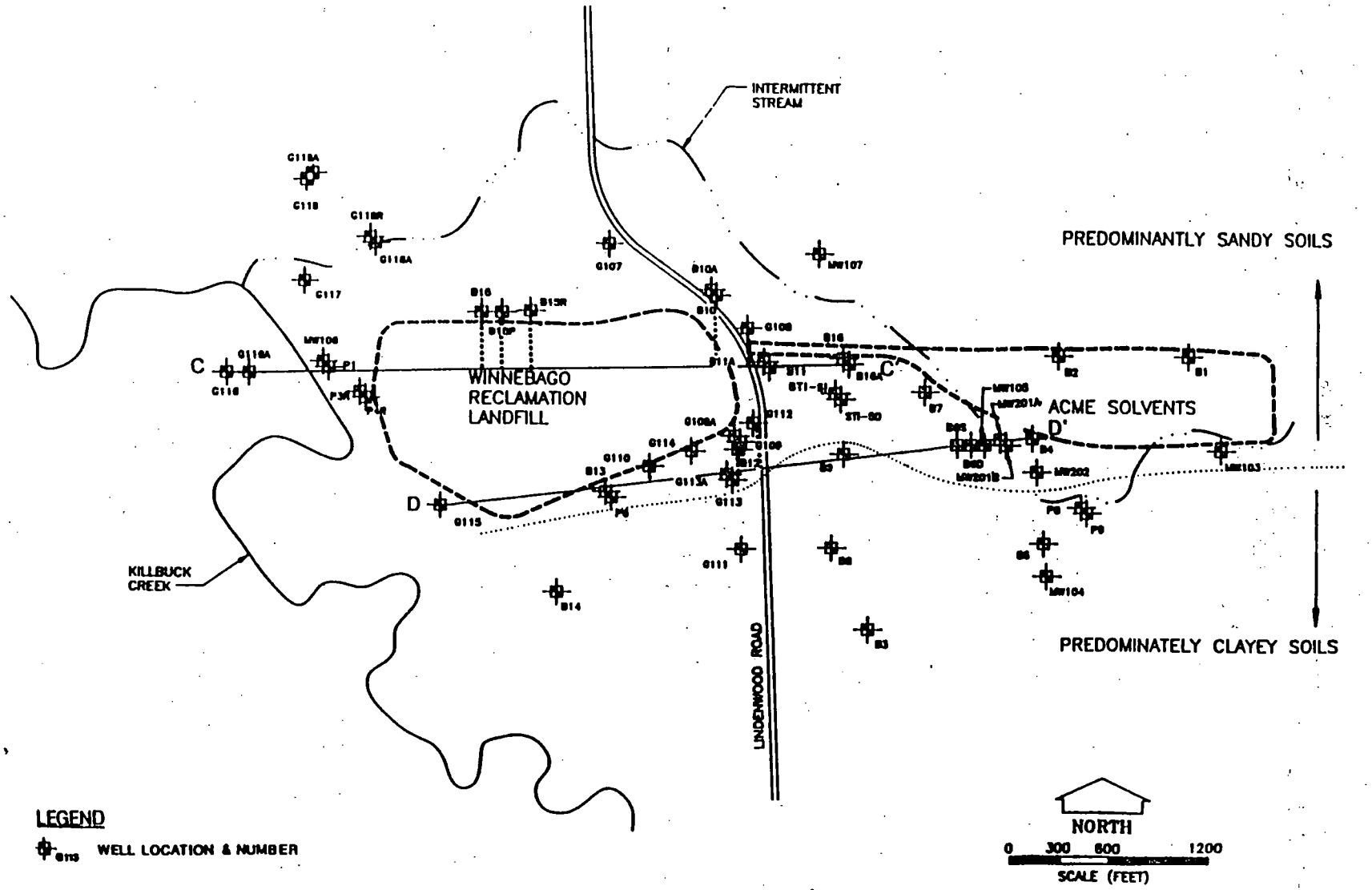
NOTES:

1. BASE MAP TAKEN FROM GAS WELL LOCATION MAP DATED OCT. 30, 1989, PROVIDED BY WINNEBAGO RECLAMATION LANDFILL.

ROUND #	WELLS SAMPLED
ROUND 1	WEST MANHOLE, A1, E7, F1, K2, (EAST MANHOLE DRY)
ROUND 2	BOTH MANHOLES, A3, B1, G3, G7
ROUND 3	C3, C8, H2, I5, (BOTH MANHOLES DRY)
ROUND 4	D1, G4, F7, EAST MANHOLE, (WEST MANHOLE & C8 DRY)
ROUND 5	BOTH MANHOLES, D1, E3, L2, N8

LEACHATE SAMPLING LOCATIONS
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS
WARZYN
13160
OF

FIGURE 4



CROSS-SECTION LOCATION MAP
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS
WARZYN

FIGURE 5

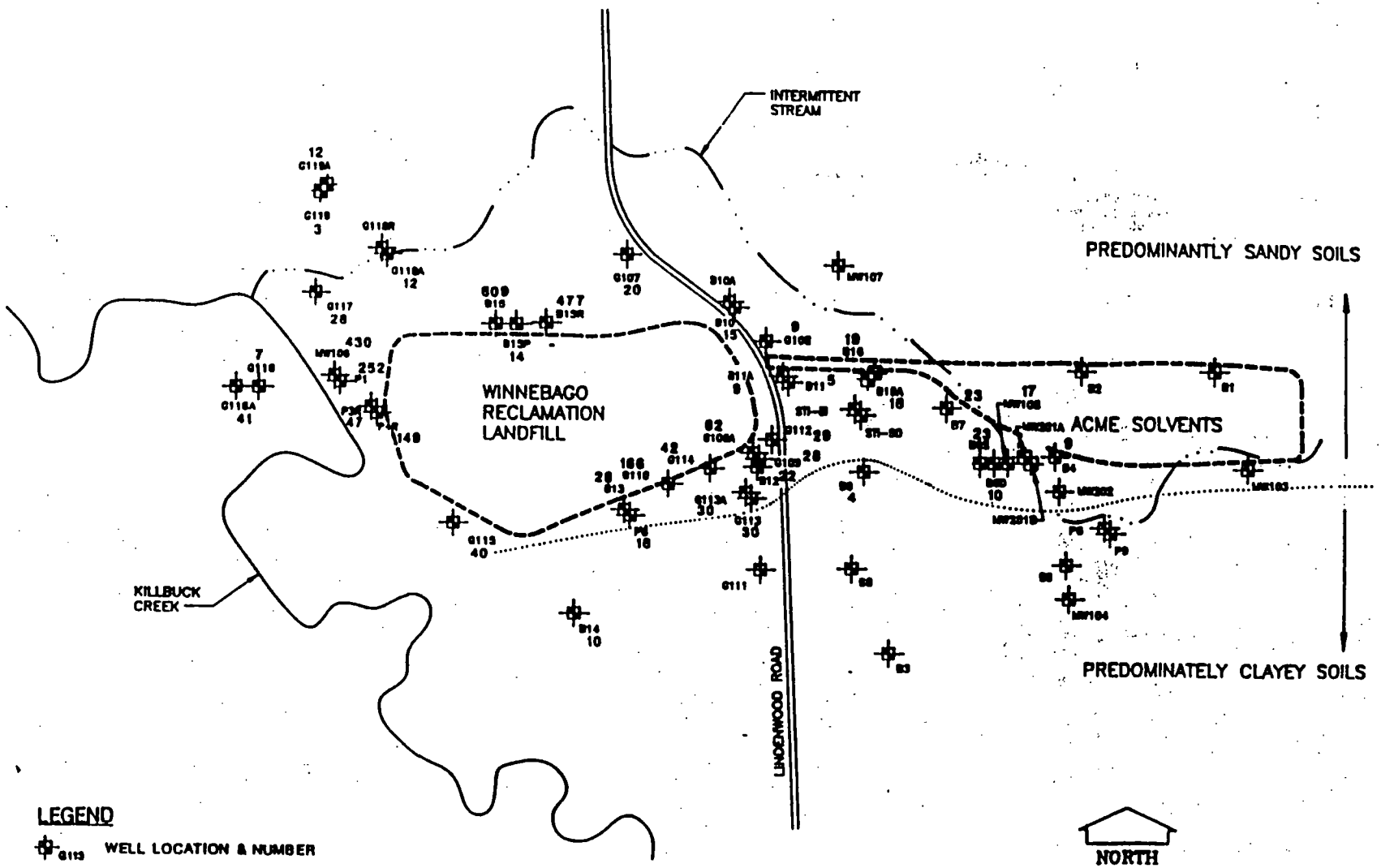

INTERMITTENT STREAM
PREDOMINANTLY SANDY SOILS
WINNEBAGO RECLAMATION LANDFILL
ACME SOLVENTS
PREDOMINATELY CLAYEY SOILS
KILLBUCK CREEK
LINDENWOOD ROAD
LEGEND
WELL LOCATION & NUMBER
30 CHLORIDE CONCENTRATION (mg/l)
NORTH
0 300 600 1200
SCALE (FEET)
ROUND 1 CHLORIDES (mg/l)
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS
WARZYN

FIGURE 6

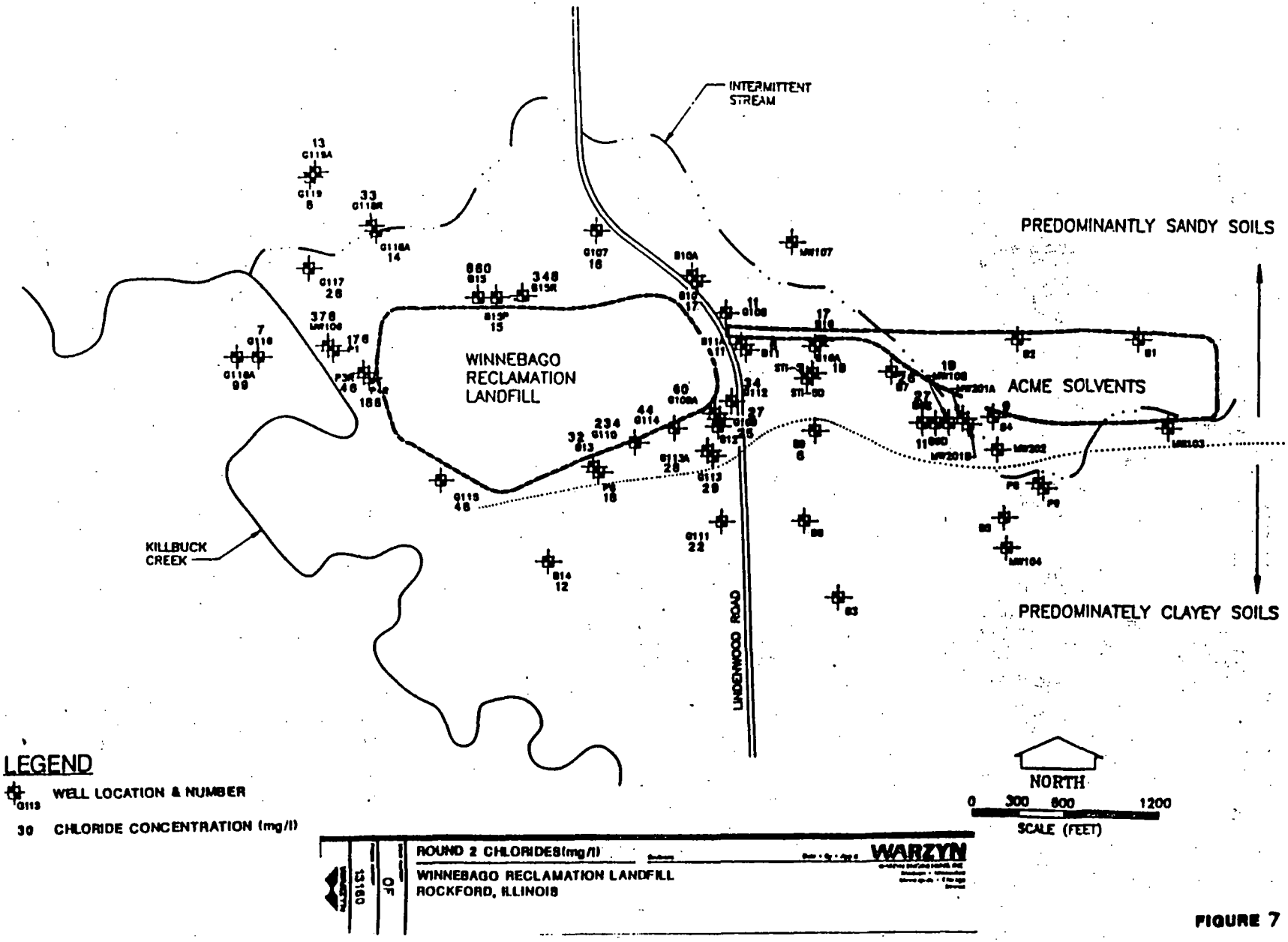
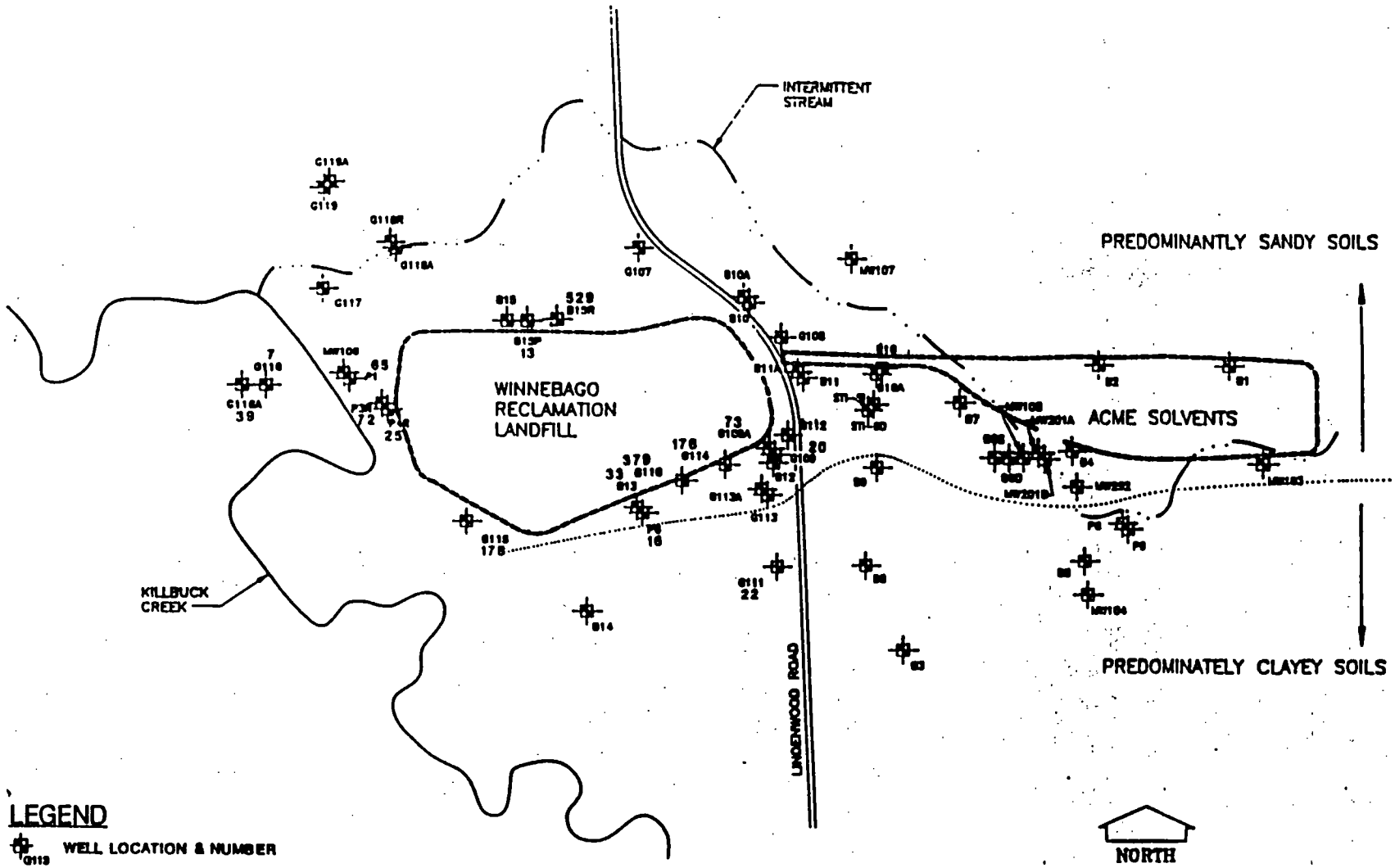

INTERMITTENT STREAM
PREDOMINANTLY SANDY SOILS
WINNEBAGO RECLAMATION LANDFILL
ACME SOLVENTS
KILLBUCK CREEK
LINDENWOOD ROAD
PREDOMINATELY CLAYEY SOILS
LEGEND
WELL LOCATION & NUMBER
30 CHLORIDE CONCENTRATION (mg/l)
NORTH
0 300 600 1200
SCALE (FEET)
ROUND 2 CHLORIDES(mg/l)
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS
WARZYN

FIGURE 7



ROUND 3 CHLORIDES(mg/l)
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

WARZYN

FIGURE 8

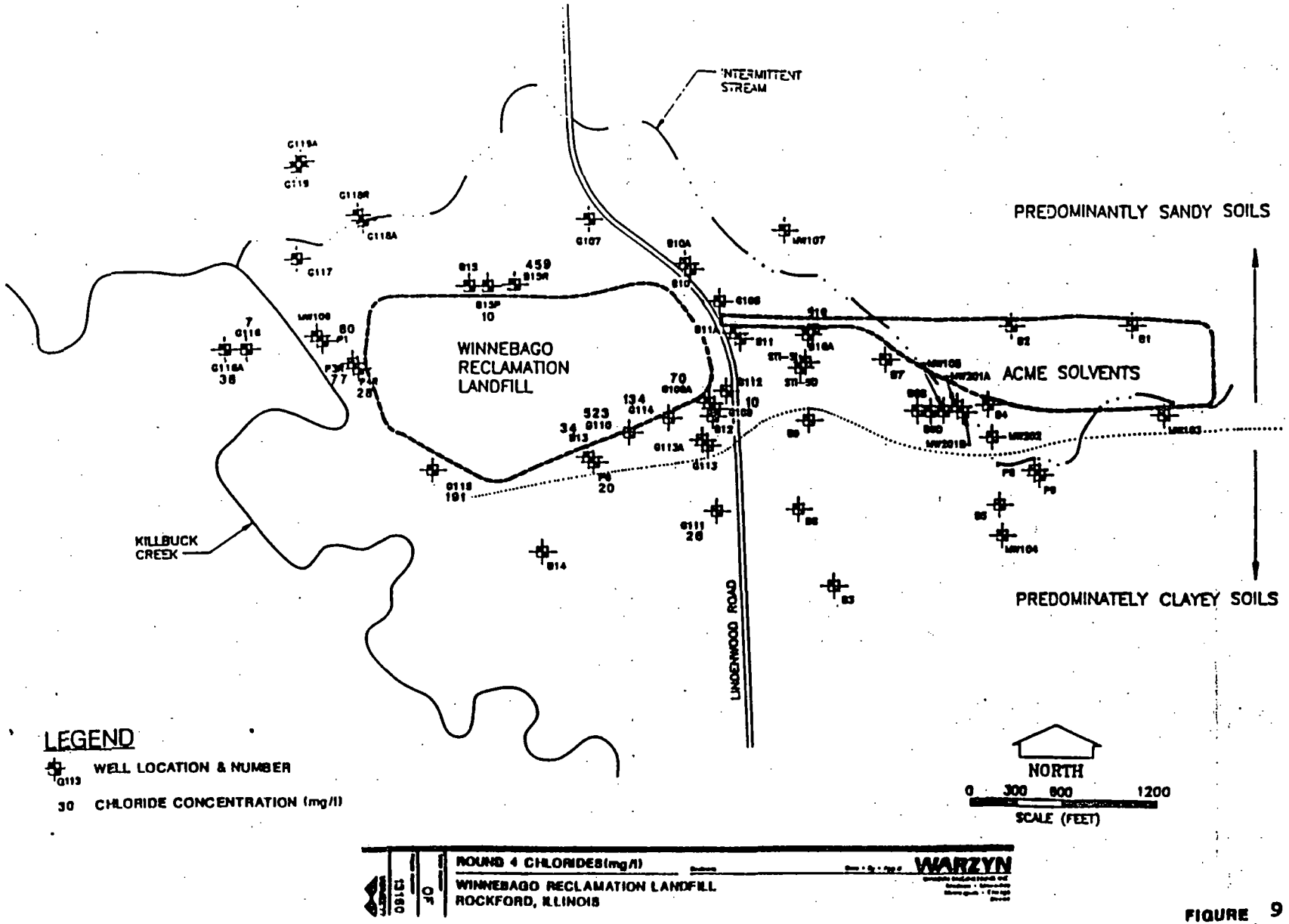

INTERMITTENT STREAM
PREDOMINANTLY SANDY SOILS
WINNEBAGO RECLAMATION LANDFILL
ACME SOLVENTS
PREDOMINATELY CLAYEY SOILS
KILLBUCK CREEK
LINDENWOOD ROAD
LEGEND
WELL LOCATION & NUMBER
30 CHLORIDE CONCENTRATION (mg/l)
NORTH
0 300 600 1200
SCALE (FEET)
ROUND 4 CHLORIDES(mg/l)
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS
WARZYN

FIGURE 9

APPENDIX B - TABLES

TABLE 1

LEACHATE SAMPLES - 1981-84, 1988-89 all values in milligrams per kilogram (mg/kg)		
COMPOUND	RANGE - 1981 to 1984	RANGE - 1988 to 1989
ORGANIC COMPOUNDS		
benzene	0.004	0.006
2-butanone	ND	0.022-22
chloroethane	ND	0.011
chloroform	ND	0.016
chloromethane	ND	0.003
di(2-ethylhexyl)phthalate	0.028	ND
1,1-dichloroethane	0.007	0.06
1,2-dichloroethene	0.078	0.004-0.22
1,2-dichloropropane	ND	0.003
diethyl phthalate	0.062	ND
2,4-dimethylphenol	3.7	ND
ethylbenzene	0.016	0.77
2-hexanone	ND	0.065-0.3
isophorone	0.098	ND
4-methyl-2-pentanone	ND	1.6
methylene chloride	0.009-0.044	ND
phenol	0.26	ND
tetrachloroethene	ND	0.017
toluene	0.005-0.26	0.02-0.32
1,1,1-trichloroethane	0.001	ND
trichloroethene	0.002	ND
vinyl chloride	ND	0.003-0.09
xylenes	0.045-0.076	0.08-0.3

LEACHATE SAMPLES - 1981-84, 1988-89 all values in milligrams per kilogram (mg/kg)		
COMPOUND	RANGE - 1981 to 1984	RANGE - 1988 to 1989
INORGANIC COMPOUNDS		
arsenic	NA	0.008-0.24
barium	NA	0.078-4.7
cadmium	NA	0.23
chloride	NA	1,160-17,300
chromium	NA	0.28-0.6
copper	NA	5.7
cyanide	NA	0.04-6
iron	NA	5.47-93.1
lead	NA	0.026-0.26
magnesium	NA	29.9-241
mercury	NA	0.0008
nickel	NA	0.32-0.78
potassium	NA	710-1,750
sodium	NA	968-10,200
zinc	NA	0.27-6.7

ND - compounds not detected in samples
NA - compounds not analyzed for

TABLE 2

GROUNDWATER SAMPLES - ROUNDS 1 & 2 all values in micrograms per liter (ug/l)				
contaminant of concern	frequency of detection	range	comparison value	comparison source
ORGANIC COMPOUNDS				
benzene	32/92	0.5-5.2	1	CREG
carbon tetrachloride	8/92	0.2-8	0.3	CREG
chloroethane	4/92	4-5	NA	NA
chloroform	2/92	0.37-11J	6	CREG
chloromethane	37/92	0.29-150	3	LTHA
1,2-dichloroethane	28/92	0.23-13	0.4	CREG
1,1-dichloroethene	14/92	0.21-6J	0.06	CREG
cis-1,2-dichloroethene	68/92	0.2-1200	70	LTHA
methylene chloride	11/92	4.3-20J	5	CREG
1,1,2,2-tetrachloroethane	7/92	0.28-18.9	0.2	CREG
tetrachloroethene	46/92	0.3-810	0.7	CREG
trichloroethene	60/92	0.3J-380J	3	CREG
1,1,1-trichloroethane	53/92	0.2-350	200	LTHA
1,1,2-trichloroethane	2/92	0.78-4J	0.6	CREG
vinyl chloride	33/92	0.2-98	0.7	Adult EMEG
INORGANIC COMPOUNDS (METALS)				
arsenic	9/91	9-40	0.02	CREG
nickel	9/91	44-224	100	LTHA
thallium	10/91	2B-6B	0.4	LTHA
vanadium	2/91	50-60	20	LTHA
zinc	13/91	37-6,340	2,000	LTHA

NA - no health comparison values available
J,B - estimated values

TABLE 3

GROUNDWATER SAMPLES - ROUNDS 3 & 4 all values in micrograms per liter (ug/l)				
contaminant of concern	frequency of detection	range	comparison value	comparison source
benzene	16/34	0.6J-17	1	CREG
chloroethane	9/34	2J-37	NA	NA
di(2-ethyl-hexyl)phthalate	4/34	7J-36	3	CREG
1,1-dichloroethene	1/34	2J	0.06	CREG
1,2-dichloroethane	5/34	2J-4J	0.4	CREG
trichloroethene	23/34	1J-28	3	CREG
vinyl chloride	14/34	1J-23	0.7	Adult EMEG
NA - no health comparison values available J - estimated value				

TABLE 4

Pathway Name	Completed Exposure Pathway Elements					Time
	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Population	
Air	WRL	Air	WRL Site	Inhalation	Local Residents, Site Workers, Trespassers	Past Future

TABLE 5

Pathway Name	Potential Exposure Pathway Elements					Time
	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Population	
Private Wells	WRL	Groundwater	Residence	Ingestion, Inhalation, Skin Contact	Local Residents	Future
Sediment	WRL	Sediment	Killbuck Creek	Ingestion, Inhalation Skin Contact	Local Residents	Future
Surface Water	WRL	Surface Water	Killbuck Creek	Inhalation, Skin Contact	Local Residents	Future
Surface Soils	WRL	Surface Soils, Leachate	WRL Site	Ingestion, Inhalation, Skin Contact	Site Workers, Trespassers	Past Present Future
Fish	WRL	Fish	Residence	Ingestion	Local Residence	Future

APPENDIX C - PUBLIC COMMENTS

PUBLIC COMMENTS

A copy of the Draft Public Health Assessment for Pagel's Pit Landfill was available for public review and comment at the Rockford Public Library at 215 North Wyman Street in Rockford, Illinois, for the period December 1 through December 30, 1994. No comments were received from the public.